

ATTACHMENT A
Remarks

Claims 1-7, 9, 10 and 12 are pending in the present application. By this Amendment, and in conjunction with the contemporaneously filed RCE, Applicant has amended the aforementioned claims. Applicant respectfully submits that the present application is in condition for allowance based on the discussion which follows.

The Abstract of the disclosure was objected to for including the phrase "conical surfaces which at axial displacement..." Applicant respectfully submits that the phrase is proper and correctly describes the arrangement of the piston and the inner sleeve and/or outer sleeve having respective interacting conical surfaces. Accordingly, Applicant respectfully requests that the objection to the Abstract be withdrawn.

Claims 1-7 and 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by WO 84/04367 ("WO '367"). By this Amendment, Applicant has amended the claims to further distinguish the present invention from WO '367.

The present invention, as recited in claim 1, relates to a hydromechanical chuck, with one end for mounting in a machining device, and with another end for releasably holding a shaft tool. The chuck comprises an inner sleeve with an axial bore for receiving a shaft of the shaft tool and a clamping means. The inner sleeve and outer sleeve enclose at least one chamber in which a clamping means, in the shape of an annular piston, is enclosed. The piston is displaceable in an axial direction by hydraulic operating means. The inner sleeve and the outer sleeve are joined together. The piston and the inner sleeve have respective contacting and interacting conical surfaces which, at axial displacement of the piston in one direction, causes radial compression of the inner sleeve for clamping the shaft tool. Axial displacement of the piston in another

direction causes relief of the inner sleeve for releasing the shaft tool, whereby forced reception via the outer sleeve is obtained. The invention also relates to a mandrel.

The present invention provides for precision machining and, in particular, forced reception during such precision machining in order to avoid flexing. The present invention overcomes problems associated with prior tools, including problems common to prior tool chucks and mandrels, where vibrations can arise due to too low rigidity against flexing in the tool mount in the machine. These vibrations, in turn, can give rise to a rough machined surface and thereby ruin a workpiece.

For exemplary purposes only, advantages of the present device are further illustrated with arrows in Fig. 2 of the present application. Due to the larger diameter of the outer sleeve, the device according to the present invention is capable of receiving considerably larger forces than previously known devices, with the result that a tool clamped by a device according to the present invention may work under a very high load without the arising vibrations cutting grooves into the surface. Accordingly, the clamping mechanism can obtain a strong tool mount having a high flexural rigidity, i.e. the ability to withstand radial forces.

WO '367 discloses a hydraulic frictional coupling for connecting two shafts or a shaft and a hub. The coupling comprises an annular chamber with an annular piston that, at an axial displacement, causes radial expansion or compression of the chamber for achieving a junction. Although, WO '367 discloses a locking mechanism, WO '367 does not teach or in any way make obvious a hydromechanical chuck for mounting in a machining device with another end to releasably hold a shaft tool.

Moreover, WO '367 fails to teach or in any way make obvious a hydromechanical chuck for mounting a machining device with another end to releasably hold a shaft tool, configured as claimed, which provides for the avoidance of flexing in the tool mounting the machine. Further, WO '367 fails to teach or in any way make obvious a device for precision machining which provides for forced reception during precision machining in order to avoid flexing in the tool mount of the machining device.

Furthermore, WO '367 relates to a completely different area of technology, i.e. mechanical power transmission systems. Nowhere in WO '367 is there any disclosure or any indication that the disclosed coupling could be used for implementation in a hydromechanical chuck or mandrel, according to the present invention. On the contrary, WO '367 specifically states, on page 17, lines 2-3, that with regard to machine tools, the technology disclosed in WO '367 is intended for completely different purposes, such as drive shafts, cranks, gears and flywheels, i.e. for machine internal components. Further, there is nothing in WO '367 that would lead a person of ordinary skill in the art toward a solution, according to the present invention. Rather, WO '367 teaches away from the present invention, as disclosed above, when distinguishing the present hydromechanical chuck from the device of WO '367.

In addition, the present invention provides surprising advantages not taught or in any way obvious from WO '367, as WO '367 relates to a completely different problem and area of technology. The present advantages consist of the fact that forced reception via the outer sleeve (the diameter of the outer sleeve allows a good moment reception and thereby a high rigidity against flexing) is obtained, while at the same time

both a very good centering and balancing of the tool and a strongly clamped tool is obtained.

Furthermore, WO '367 fails to teach or in any way make obvious a device having a clamping mechanism which provides a strong tool mount having a high flexural rigidity, thereby allowing it to withstand radial forces. On the contrary, the objective of the WO '367 device is to resist axial thrust, i.e. forces in the axial direction, and is consequently aimed at a completely different area of technology.

Based on the foregoing, Applicant respectfully submits that the present invention is novel and in no way obvious in view of WO '367 and, therefore, respectfully requests that the rejection to claims 1-7 and 12 under 35 U.S.C. § 102(b) as being anticipated by WO '367 be withdrawn.

Claims 1-3, 5-7 and 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by Firestone et al. (U.S. Patent No. 3,208,759) (hereinafter "Firestone") and claim 4 was rejected under 35 U.S.C. § 103(a) as being obvious in view of Firestone.

Contrary to the rejection, Firestone fails to anticipate or in any way make obvious the claimed invention, as Firestone discloses a completely different hydromechanical clamping device as compared to the present invention, as claimed. According to the Examiner, the inner sleeve is to be considered as consisting of not only what in Firestone is considered as the sleeve, i.e. part (40), but also the collet (70). If, *arguendo*, as stated by the Examiner, the inner sleeve consists of both collet (70) and sleeve (40), the inner sleeve (40, 70) and outer sleeve (10) enclose a chamber in which an annular piston (15) is enclosed, and which piston (15) is displaceable in an axial direction by hydraulic operating means.

If the Firestone piston (15) and the inner sleeve (40, 70) are, in a broad sense, to be considered to have interacting conical surfaces, an intermediate means in the form of ball (60) provides the contact point. Axial displacement of the piston (15) in a locking direction causes radial compression of the collet (part 70) for clamping the shaft tool, wherein a bevel (16) of the piston engages balls (60) and forces them into a seated position (as shown in Firestone, Figs. 1 and 2). When the balls are forced inwardly, they engage a taper (59) of the sleeve (40) which forces the inner sleeve part (40) upwardly in the figures. As the sleeve (40) is forced upward, the taper (52) of the sleeve (40) presses against the taper (72) of the collet (70) and forces the collet (70) into a closed position.

Even with this extremely wide and arguable interpretation of what Firestone actually discloses with respect to the present invention, the amended claims differ substantially from what is disclosed in Firestone. The claims clearly recite that the inner sleeve and the outer sleeve are joined together. If Firestone is to meet this claim limitation, the inner sleeve cannot be considered to consist of portions (40, 70), but only of the collet (70), since the sleeve (40) is movable with respect to the outer sleeve (10, 11). However, if the inner sleeve is constituted by the collet (70), the inner sleeve and the piston do not have conical surfaces which contact and interact with each other, as is now clarified in the amended claims. Therefore, Firestone fails to anticipate the claimed inner sleeve, outer sleeve and piston.

In summary, the locking mechanism, according to the present invention, is accomplished in a completely different manner as compared to Firestone. Further, the present device has the advantage that it provides for a strong tool mount while

simultaneously providing very good centering and balancing of the tool. This is accomplished by an arrangement which provides a strongly clamped tool with a considerable contact surface between the inner sleeve and tool when compared to Firestone. Conversely, the arrangement disclosed by Firestone has the disadvantage that the tool will be clamped substantially at a single point, since it is essentially the top end of the collet (70) that will accomplish the clamping of the tool. Therefore, the device according to the present invention is totally different from the device according to Firestone. Further, there is nothing in Firestone that teaches or in any way directs a user toward a device as disclosed in the present invention, wherein the inner sleeve and outer sleeve are joined together and have conical surfaces that contact and interact with each other. Therefore, Applicant respectfully submits that the present invention is novel and non-obvious in view of Firestone.

Based on the foregoing, Applicant respectfully submits that claims 1-3, 5-7 and 12 are not anticipated by Firestone under 35 U.S.C. § 102(b) and that claim 4 is not made obvious in view of Firestone under 35 U.S.C. § 103(a).

Claims 1-3, 5-7 and 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by German patent DE 3502362 (hereinafter "DE '362") and claim 4 was rejected under 35 U.S.C. § 103(a) as being obvious in view of DE '362.

Applicant respectfully submits that DE '362 fails to teach or in any way make obvious the present device, since the inner and outer sleeves of the DE '362 device are not movable with respect to each other. Further DE '362 fails to disclose a device wherein the inner sleeve and the outer sleeve each have contacting and interacting conical surfaces.

Consequently, the device, according to the present invention, is totally different from the device of DE '362. Moreover, there fails to be any disclosure which would lead one of ordinary skill in the art to the presently claimed device. Similarly, claims 9 and 10 are novel and non-obvious over the prior art based on the prior discussion.

In view of the foregoing, Applicant respectfully requests that the rejection to claims 1-3, 5-7 and 12 under 35 U.S.C. § 102(b) and the rejection to claim 4 under 35 U.S.C. § 103(a) as being anticipated by and obvious in view of DE '362 be withdrawn.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance.

END REMARKS